CHALMERS DST

Corrugated board torsional stiffness testing for complete process control.

Since the introduction of the Chalmers DST (dynamic stiffness tester) to the global market in 2008, more than 130 machines have been purchased for use in corrugated box plants. Most of these sales have been in Europe and Australasia, and now the DST is being launched into North America.

The machine measures MD torsional stiffness, which is a very sensitive measure of how well the flutes have been made and how much damage they have sustained during the conversion of board into boxes. The test is easy to perform and can be used successfully by technical staff, engineers and operators to gain instant feedback on how well converting equipment is performing.

In 1989, Joseph Bick (formerly of Owens Illinois) wrote in a corrugated industry publication that "The cost of crushing flutes is high" but that "crush was difficult to measure and commonly understated". His data showed that a board crush of 10% cost an extra 17% in paper costs to rectify. Not much has changed since 1989, as most U.S. companies continue to crush their board during manufacture. The Chalmers DST now offers the opportunity to quickly and accurately measure crush.

No Lab Required

The machine provides board converting companies with the necessary information to ensure that they manufacture the best boxes possible using current equipment. The process requires commitment, but anyone can do it. It is simple to use — converters do not need an expensive lab or dedicated technician, just a desire to make better board, better boxes and save costs.

Benchmark studies undertaken by Korutest clients have revealed that by the time corrugated boxes leave the plant they have typically lost more than 30% of their potential stacking performance. This is due to poorly manufactured flutes and crush damage to the flutes during box making. Nearly every plant has this problem but most do not realize how bad it is until they can accurately measure it with a DST.

To overcome flute damage most plants use heavier paper grades than is called for. This extra "safety factor" is required to provide the necessary stacking strength — which is an expensive way to guarantee performance. By using the Chalmers DST companies can reduce their "safety factor" and reap the rewards of:

- Cost savings in raw materials — to keep or to pass on to customers
- More consistent and better performing boxes
- Opening doors to clients who insist on lighter cartons without compromised performance

You may already be conducting tests that you think tell you enough about the quality of your board. Unfortunately, these tests tell you more about the quality and quantity of the individual components — not how well you are making and printing your board. For example, the Edge Crush Test (ECT) provides very little information on flute formation or crush. ECT is a failure test that is largely dependent on the quantity of material used.

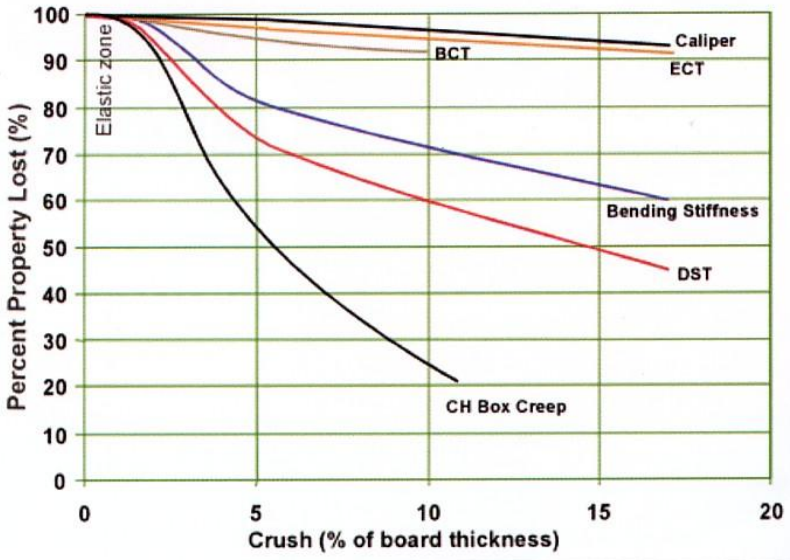
The data in the chart below comes from a large trial conducted by Ensis Papro (CSIRO) while evaluating the Chalmers DST. It shows the relationship between percent board crush on the X axis and industry standard tests. Caliper, ECT and BCT are very poorly related to board crush. A physical crush of 10% shows a loss of 3.5% for caliper, 5% for ECT and 8% for BCT. This lack of sensitivity to crush can provide a false sense of security for manufacturers.

> BY MINIMIZING CRUSH AND PRODUCING THE BEST CORRUGATED BOX POSSIBLE, CUSTOMER COMPLAINTS WILL DRAMATICALLY DECREASE AND FIBER REDUCTION CAN BECOME A REALITY.

The stiffness properties are even more sensitive — at 10% crush, we lose 28% for bending stiffness and 40% for MD torsional stiffness (Chalmers DST). While these numbers may seem out of proportion to the initial crush they are a more transparent indication of the amount the board (and the final box) has been compromised. Because corrugated board is an engineered structure its inherent strength is much greater than the sum of its parts. In box stacking situations MD torsional stiffness failure is the primary failure that leads to bending stiffness failure, which leads to box panel buckling, then compression failure of the inside liner, then panel collapse and finally box collapse.

The Chalmers DST measures MD torsional stiffness with a coefficient of variability of less than 0.5% and provides enough information to raise product quality and reduce performance variability.

By minimizing crush and producing the best corrugated box possible, customer complaints will dramatically decrease and fiber reduction can become a reality. If sustainability and lightweighting of your boxes are on your agenda then the Chalmers DST is a must have.



PLOT OF CORRUGATED BOARD PROPERTY VERSUS PERCENT CRUSH.

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